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IS 12938 (1990): Acceptance standards for radiographic inspection of steel castings [MTD 14: Foundry]



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*Indian Standard*

ACCEPTANCE STANDARDS FOR  
RADIOGRAPHIC INSPECTION OF  
STEEL CASTINGS

UDC 669.14-14 : 620.179.15

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**BUREAU OF INDIAN STANDARDS**  
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## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 5 April 1990, after the draft finalized by the Steel Castings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

For the interpretation of radiographs and the assignment of radiographic quality levels to a casting, it is necessary to use a standard set of reference radiographs. The reference radiographs available from ASTM are the only internationally issued and recognized documents that may be used for this purpose.

While preparing this standard, assistance has been derived from ISO 4993 : 1986 'Steel castings — radiographic inspection', issued by the International Organization for Standardization.

# *Indian Standard*

## ACCEPTANCE STANDARDS FOR RADIOGRAPHIC INSPECTION OF STEEL CASTINGS

### 1 SCOPE

**1.1** This standard specifies the general requirements for the radiography of steel castings by means of X-rays or gamma rays in accordance with procedures given in IS 2595 : 1978.

### 2 REFERENCES

**2.1** The Indian Standards listed below are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
2595 : 1978	Code of practice for radiographic testing ( <i>first revision</i> )
2953 : 1985	Glossary of terms used for interpretation of welds and castings radiographs ( <i>first revision</i> )
3657 : 1978	Radiographic image quality indicators ( <i>first revision</i> )
8780 : 1978	Code of practice for non-destructive testing of steel castings

### 3 TERMINOLOGY

**3.1** For the purpose of this standard, the definitions given in IS 2953 : 1985 shall apply.

### 4 BASIS OF PURCHASE

**4.1** The request for radiographic examination and all pertinent information relating thereto, such as sensitivity, coverage and acceptance criteria, shall be indicated in the enquiry and order.

It is open to the purchaser to specify at the time of enquiry and order, different quality levels for different areas of even the same casting.

**4.2** Radiographic coverage may be of two types — Pilot or Regular Production Inspection, as may be specified in the enquiry and order. For both types of inspection, the area to be examined and the frequency of the examination shall be as specified in the enquiry and order, or as mutually agreed upon.

**4.3** If requirements are imposed for which no accepted standard or document is available, a

detailed specification of such requirements shall be provided at the time of enquiry and order.

**4.4** Unless otherwise specified in the enquiry and the order, Radiographic Quality Level (sensitivity) required for radiography shall be 2 percent.

### 5 TIME OF EXAMINATION

**5.1** Unless otherwise specified in the enquiry and order, the radiographic examination may be performed at any point in the manufacturing cycle, before or after the final heat treatment.

**5.2** The surface preparation of the area to be examined shall be such that any surface irregularities do not mask or be confused with discontinuities.

**5.3** The penetrometer or image quality indicator to be used shall conform to IS 3657 : 1978, or may be of any other type provided that the required sensitivity level is achieved.

### 6 PERSONNEL QUALIFICATIONS

**6.1** Operations shall be carried out by qualified personnel. The system of qualification shall be agreed upon between the purchaser and the supplier (foundry) and shall form a part of the technical specification, or be stated in the enquiry and order.

### 7 SHOOTING SKETCHES

#### 7.1 Shooting sketches for Pilot Inspection

When specified in the enquiry and order preliminary shooting sketches shall be prepared by the supplier for submission with the radiographs of the pilot casting for approval by the customer. These sketches shall show the area of the part to be examined, and shall include the following information for each exposure:

- a) The gamma source or kilovoltage used.
- b) The location of radiation in relation to the area covered, and the film.
- c) The physical size of the source.
- d) The area covered by the film.
- e) The placement of the film and location markers.

- f) The film-to-source distance.
- g) The placement of the image quality indicators or penetrameters and the image quality value.
- h) The section thickness.
- j) The number and types of films used.
- k) The film identification.
- m) The thickness and type of intensifying screens.
- n) The value of density required.
- p) The geometrical unsharpness.
- q) The conditions of development of films.

### **7.2 Shooting Sketches for Regular Production Inspection**

The preliminary shooting sketch may, by mutual agreement between the supplier and the purchaser, be adjusted at the time of examination of the first casting sample. Subsequent production castings shall be examined in accordance with the finalized shooting sketches, which shall include the information as given in 7.1. Any new criteria established for the radiography of the production castings, such as changes in the percentage of coverage of the part or changes in the acceptance standards, shall be stated.

## **8 REJECTION/ACCEPTANCE CRITERIA**

**8.1** The rejection/acceptance criteria shall be

specified in the purchase order and shall be based on the applicable documents reference in ASTM reference radiographs.

## **9 FOUNDRY RESPONSIBILITY**

**9.1** Unless otherwise specified at the time of enquiry and order, the responsibility of the supplier ( foundry ) is limited to the attainment of the standards specified in the order in all castings or portions of castings specifically calling for radiographic examination. Castings or portions of castings not required to be radiographically examined by the foundry shall not be subject to rejection based upon results of any subsequent radiographic examination. Also, castings shall not be subject to rejection based upon radiographic re-examination subsequent to their acceptance on the basis of the original radiography, if such examination is carried out by techniques other than those agreed upon at the time of enquiry and order, and/or in a manner different from that described in the finalized shooting sketch (7.2).

## **10 RECORDS**

**10.1** Unless otherwise agreed upon between the supplier and the purchaser, records of radiographic inspection shall be kept by the supplier for a period of atleast 3 years from the date of supply of the relevant casting.

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